

THE INVENTION CLAIMED IS:

1. A method of comparing the flow rate through one or more orifices in a workpiece, wherein each workpiece orifice is formed to resemble an orifice in a master part and wherein the flow rate through the one or more workpiece orifices is compared against the flow rate through the matching one or more orifices in the master part to determine whether or not the flow rate through the one or more workpiece orifices is within tolerance relative to the flow rate through the one or more master orifices comprising the steps of:
  - a) forcing calibration fluid from a reservoir under pressure through the one or more orifices in the master part;
  - b) forcing calibration fluid from the same reservoir under the same pressure through the one or more orifices in the workpiece;
  - c) controlling the flow of fluid to provide an equal flow rate through the one or more orifices in the workpiece and the one or more orifices in the master part; and
  - d) comparing the media pressure downstream of each the workpiece and the master part to determine whether or not the pressure differential is within predetermined limits indicating whether or not the flow rate through the one or more orifices in the workpiece are within tolerance.

2. The method according to claim 1, wherein the fluid is non-abrasive.
3. The method according to claim 1, wherein the one or more orifices in the workpiece define a workpiece outlet and the one or more orifices in the master part define a master part outlet and wherein the pressure differential is measured at the workpiece outlet and at the master part outlet.

4. The method according to claim 1, wherein the fluid is a flowable abrasive media and wherein the master part material is impervious to and unaffected by the flowable abrasive media and wherein the step of forcing the calibration fluid through the one or more workpiece orifices polishes the one or more workpiece orifices.

5. The method according to claim 4, further including, subsequent to the step of comparing the media pressure, the step of terminating the flow of abrasive media past the one or more workpiece orifices when the difference between the pressure downstream of the workpiece and downstream of the master part is equal to or less than a predetermined value.

6. A method of comparing the flow rate through one or more orifices in multiple workpieces formed to resemble one or more orifices in a master part with the flow rate through the one or more master part orifices to determine whether or not the flow rate through the one or more orifices in each of the multiple workpieces is within tolerance relative to the flow rate through the matching one or more master part orifices comprising the steps of:

- a) forcing calibration fluid from a reservoir under pressure through the one or more orifices in the master part;
- b) forcing calibration fluid from the same reservoir under the same pressure through the one or more orifices in each of the multiple workpieces;
- c) controlling the flow of media to provide an equal flow rate through the one or more orifices in each of the multiple workpieces and the one or more orifices in the master part; and

d) comparing the media pressure downstream of each of the multiple workpieces and master part to determine whether or not the pressure differential is within predetermined limits indicating whether or not the flow rate through the one or more orifices in each of the workpieces is within tolerance.

7. A method of comparing the flow rate through one or more orifices in a workpiece, wherein the one or more workpiece orifices are formed to resemble one or more orifices in a master part wherein the flow rate through the workpiece is compared with the flow rate through the master part to determine whether or not the flow rate through the one or more workpiece orifices is within tolerance relative to the flow rate through the one or more master part orifices and machining the one or more workpiece orifices using abrasive flow media comprising the steps of:

a) extruding flowable abrasive media from the a reservoir under pressure through the one or more orifices in the master part, wherein the master part material is impervious to and unaffected by the abrasive flow media;

b) extruding flowable abrasive media from a reservoir under pressure through the one or more orifices in the workpiece; wherein prior to the extrusion the one or more workpiece orifices restrict flow more than the one or more master part orifices;

c) controlling the flow of media to provide an equal flow rate through the one or more workpiece orifices and through the one or more master part orifices;

d) comparing the media pressure downstream of the workpiece and the master part; and

e) stopping the extrusion through the one or more workpiece orifices when the pressure differential of the media exiting the one or more workpiece

orifices and the media exiting the one or more master orifices is between predetermined limits.

8. The method according to claim 7, wherein the step of stopping the extrusion occurs when the pressure differential is 35-40 psig or less.

9. The method according to claim 7, wherein the one or more orifices in the workpiece form a workpiece outlet, the one or more orifices in the master part form a master part outlet and wherein the step of comparing the media pressure downstream of the workpiece and of the master part is done by measuring the pressure differential between the downstream pressures at the exit of the one or more master part orifices and the exit of the one or more workpiece orifices.

10. The method according to claim 7, wherein the step of comparing the media pressure downstream of the workpiece and the master part is done by measuring the pressure at the exit of the one or more master part orifices and at the exits of the workpiece one or more orifices and comparing these values.

11. A method of comparing to a master part the flow rate through one or more orifices in multiple workpieces, wherein the one or more orifices in each workpiece are formed to resemble one or more orifices in the master part and wherein the flow rate through the one or more orifices in the multiple workpieces is compared with the flow rate through the one or more master part orifices to determine whether or not the flow rate through the one or more orifices in each workpiece is within tolerance relative to the flow rate through the

one or more master part orifices and thereafter machining the one or more workpiece orifices using abrasive flow media comprising the steps of:

- a) extruding flowable abrasive media from the a reservoir under pressure through the one or more orifices in the master part, wherein the master part material is impervious to and unaffected by the abrasive flow media;
- b) extruding flowable abrasive media from a reservoir under the same pressure through the one or more orifices in each workpiece, wherein prior to the extrusion the one or more orifices in each workpiece restrict flow more than the one or more orifices in the master part;
- c) controlling the flow of media to provide an equal flow rate through each of the workpieces and through the master part;
- d) comparing the media pressure downstream of each of the workpieces with the pressure downstream of the master part; and
- e) stopping the extrusion through any workpieces when the differential between the pressure downstream of any of the workpieces and the pressure downstream of the master part is within predetermined limits.

12. An apparatus for comparing the flow rate through one or more orifices in a workpiece with the flow rate through one or more orifices in a master part, wherein the one or more workpiece orifices are formed to resemble one or more orifices in the master part, wherein the flow rate is compared to determine whether or not the flow rate through the one or more orifices in the workpiece are within tolerance relative to the flow rate through the one or more orifices in the master part, wherein the apparatus is comprised of:

- a) a reservoir for supplying calibration fluid under pressure to the one or more orifices in the master part and to the one or more orifices of the workpiece;

- b) a flow controller associated with the workpiece and the master part such that the flow of fluid from the reservoir through the one or more orifices in each of the workpiece and the master part is equal;
- c) a measurement device for comparing the pressure downstream of the master orifice and the pressure downstream of the workpiece, wherein when the pressure differential downstream of the workpiece and downstream of the master part is within a predetermined limit, the orifices in that workpiece are deemed to be within tolerance.

13. The apparatus according to claim 12, wherein the flow controller associated with the workpiece and the master part is a receiving cylinder downstream of each the workpiece and master part and is a retractable piston within each cylinder that limits and thereby controls the flow of fluid through the one or more orifice of the workpiece and the master part.

14. The apparatus according to claim 13, wherein each retractable piston is coupled to another retractable piston such that the controlled flow through each of the workpiece and the master part is equal.

15. The apparatus according to claim 13, wherein each retractable piston is independently movable by a central operator capable of moving all pistons in unity with the master part piston or capable of moving select pistons in unity with the master part piston and keeping other pistons stationary.

16. The apparatus according to claim 12, wherein the measurement device is a pressure gauge downstream of each of the workpiece and the master part.

17. The apparatus according to claim 12, wherein the measurement device is a pressure comparator downstream of each of the workpiece and the master part.

18. The apparatus according to claim 12, wherein the fluid is a flowable non-abrasive media.

19. The apparatus according to claim 12, wherein the fluid is a flowable abrasive media and wherein the master part material is impervious to and unaffected by the abrasive flow media.

20. A method of determining the flow rate through a workpiece having one or more orifices formed to resemble one or more orifices in a master part comprising the steps of:

a) forcing calibration fluid from a reservoir under pressure through the one or more orifices in the master part;

b) forcing calibration fluid from the same reservoir under the same pressure through the one or more orifices in the workpiece;

c) controlling the flow of fluid to provide an equal flow rate through each of the workpiece and the master part;

d) comparing the media pressure downstream of the master part and the workpiece to determine a pressure difference; and

e) calculating the flow rate through the workpiece using predetermined flow rate data about the master part, the difference in downstream pressure

between the workpiece and the master part, and the mathematical relationship between the orifices in the master part and the orifices in the workpiece.

21. The method according to claim 20, wherein the one or more orifices in the workpiece form a workpiece outlet, the one or more orifices in the master part form a master part outlet and wherein the pressure differential is measured at the outlet of the master part and at the outlet of the at least one workpiece.

22. The method according to claim 20, wherein the predetermined flow rate data about the master part is provided by testing the master part using a flow bench.